NISTTech

FRICTION AND WEAR RESISTANT COATING FOR TITANIUM AND ITS ALLOYS

Significantly reduce wear and improve durability of titanium and its alloys

Description

Coatings to improve the friction coefficient and the anti-wear properties of titanium and titanium alloys have been developed in the NIST Labs. Incorporation of diamond powder in the coatings further improve these coatings.

This invention provides a friction and wear resistant coated titanium or titanium alloy which includes a titanium or titanium alloy substrate, a first layer of TixOy bonded to a surface of the titanium of titanium alloy substrate and a second layer comprising a cured epoxy resin bonded to the first layer. It has been found that these coatings significantly reduce the wear and the coefficient of friction for titanium and its alloys when its slides on an uncoated harder alloy. In this manner, the durability of the protected titanium or titanium alloy can be significantly improved.

Titanium and its alloys are widely used in the aerospace and machinery industries, as well as in biomedical prosthesis devices due to its high strength, light weight, high modulus and corrosion resistance. However, application of titanium and its alloys in tribological applications under load such as bearings and bushings is impeded by the high friction coefficient of titanium and its alloys which may result in the apparatus seizing up.

Applications

- **Tribology**
  Reduced the friction and wear on titanium helping to advance the field of tribology
- **Biomedicine**
  This new method of lubrication may now allow titanium and its alloys to be used in joint replacements
- **Aerospace and Machinery**
  New way of lubricating titanium and its alloys opens even more possibilities for the metals in the aerospace and machinery industries

Advantages

- **Reduces friction and protects surfaces**
  This invention greatly reduces the frictional coefficient of titanium and other similar metals allowing for new applications of the materials

Abstract

For titanium and titanium alloys in tribological applications under bound lubrication conditions, there are employed epoxy coatings adhered to the surface of the titanium or titanium alloy by a titanium oxide primer layer. The anti-wear properties of the epoxy coating can be improved by incorporation of an anti-wear filler such as diamond powder. These coatings improve the friction coefficient and anti-wear properties of the titanium and titanium alloys.

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References

- Expired U.S. Patent # 5,633,086
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Status of Availability

This technology is available in the public domain.

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